

CLAIMS

1. A semiconductor device, comprising:

a p-type nitride semiconductor layer; and

5 a p-side electrode including a palladium oxide film connected to a surface of the nitride semiconductor layer.

2. The semiconductor device of claim 1, wherein the palladium oxide film includes a platinum sulfide structure type palladium oxide crystal.

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3. The semiconductor device of claim 2, wherein a percentage content of the platinum sulfide structure type palladium oxide crystal included in the palladium oxide film is not less than about 50 %.

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4. The semiconductor device of claim 1, wherein the p-side electrode includes a palladium film on a surface of the palladium oxide film.

20 5. The semiconductor device of claim 1, wherein the p-side electrode includes a platinum film on the palladium oxide film.

6. The semiconductor device of claim 4, wherein the p-side electrode includes a first nickel containing film, made partly 25 of a nickel oxide, on a surface of the palladium film, and a gold film on a surface of the first nickel containing film.

7. The semiconductor device of claim 6, wherein the p-side electrode includes a second nickel containing film, made partly of a nickel oxide, on the gold film.

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8. The semiconductor device of claim 7, wherein mol fraction of oxygen contained in the first nickel containing film is less than the mol fraction in the second nickel containing film.

10 9. A method for fabricating an electrode, comprising:

depositing a palladium film on a p-type semiconductor layer; and

15 forming a palladium oxide film by annealing the semiconductor layer in an oxygen ambience so as to oxidize the palladium film adjacent to the semiconductor layer.

10. The method of claim 9, wherein the annealing is executed in a temperature range from about 200 °C to about 400 °C.

20 11. The method of claim 9, further comprising:

depositing a platinum film on the palladium film before the annealing.

12. The method of claim 9, further comprising:

25 sequentially depositing a nickel film and a gold film on the palladium film before the annealing.

13. The method of claim 9, wherein the semiconductor layer is a nitride semiconductor.

5 14. The method of claim 9, wherein the palladium oxide film includes a platinum sulfide structure type palladium oxide crystal.

10 15. A method for manufacturing a semiconductor device, comprising:

growing an epitaxial growth layer including a light-emitting layer on a substrate, and a p-type contact layer on the epitaxial growth layer;

15 depositing a palladium film on the contact layer; and forming a palladium oxide film by annealing the substrate in an oxygen ambience so as to oxidize the palladium film adjacent to the contact layer.

16. The method of claim 15, wherein the annealing is executed 20 in a temperature range from about 200 °C to about 400 °C.

17. The method of claim 15, further comprising:

depositing a platinum film on the palladium film before the annealing.

18. The method of claim 15, further comprising:

sequentially depositing a nickel film and a gold film on the palladium film before the annealing.

19. The method of claim 15, wherein the contact layer is a nitride 5 semiconductor.

20. The method of claim 15, wherein the palladium oxide film includes a platinum sulfide structure type palladium oxide crystal.